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ABSTRACT

The general purpose of the occupational analysis is to provide workable, basic information dealing with the many and varied duties performed in the air conditioning, refrigerating, and heating occupation. The document opens with a brief introduction followed by a job description. The bulk of the document is presented in table form. Six duties are broken down into a number of tasks and for each task a two-page table is presented, showing on the first page: tools, equipment, materials, objects acted upon; performance knowledge (related also to decisions, cues and errors); safety--hazard; and on the second page: science; math--number systems; and communications (performance modes, examples, and skills and concepts). The duties include installing, troubleshooting, servicing, and repairing refrigeration and air conditioning equipment and warm air heating systems. Included are lists for a standard tool kit, test equipment, and standard supplies. An appendix relates the duties to air conditioning, refrigeration, and heating. (BP)

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Occupational Analysis

CE 004 265

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AIR CONDITIONING, REFRIGERATING AND HEATING

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Instructional Materials Laboratory
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AN ANALYSIS OF THE AIR CONDITIONING, REFRIGERATING AND HEATING OCCUPATIONS

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FOREWORD

The occupational analysis project was conducted by The Instructional Materials Laboratory, Trade and Industrial Education, The Ohio State University in conjunction with the State Department of Education, Division of Vocational Education pursuant to a grant from the U.S. Office of Education.

The Occupational Analysis project was proposed and conducted to train vocational educators in the techniques of making a comprehensive occupational analysis. Instructors were selected from Agriculture, Business, Distributive, Home Economics and Trade and Industrial Education to gain experience in developing analysis documents for sixty-one different occupations. Representatives from Business, Industry, Medicine, and Education were involved with the vocational instructors in conducting the analysis process.

The project was conducted in three phases. Phase one involved the planning and development of the project strategies. The analysis process was based on sound principles of learning and behavior. Phase two was the identification, selection and orientation of all participants. The training and workshop sessions constituted the third phase. Two-week workshops were held during which teams of vocational instructors conducted an analysis of the occupations in which they had employment experience. The instructors were assisted by both occupational consultants and subject matter specialists.

The project resulted in producing one hundred two trained vocational instructors capable of conducting and assisting in a comprehensive analysis of various occupations. Occupational analysis data were generated for sixty-one occupations. The analysis included a statement of the various tasks performed in each occupation. For each task the following items were identified: tools and equipment; procedural knowledge; safety knowledge; concepts and skills of mathematics, science and communication needed for successful performance in the occupation. The analysis data provided a basis for generating instructional materials, course outlines, student performance objectives, criterion measures as well as identifying specific supporting skills and knowledge in the academic subject areas.

PREFACE

This occupational analysis conducted for the air conditioning, refrigeration, and heating occupations presented the writers with several difficult decisions and alternatives. Each area of the occupations has a separate identity and has functioned in this manner for many years. However, the growth of the refrigeration and air-conditioning industry has brought these identities closer together because many of the duties and tasks performed on the job are interrelated. Many of the skills are common to each area. Therefore, if we are to offer a training program, the entire scope of the air conditioning, refrigeration and heating occupations should be included in the course content. The list of tasks found in the appendix identifies the interrelationships of the tasks performed in each area of the occupation.

There are many job opportunities within the air conditioning, refrigeration and heating fields which specialize in one or several specific areas. Training individuals for entry level into these fields should be conducted to include all the basic skills of the refrigeration, air conditioning and heating occupations. The objective of this occupational analysis is to encompass all the duties and tasks of the technician in these fields. In the time available to complete the analysis, an in depth study was not possible. Therefore, an overview of the air conditioning, refrigeration and heating occupations was more realistic. Hopefully, it will provide some basis for future study.

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JOB DESCRIPTION

An air conditioning, refrigeration and heating technician engages in the installation of air conditioning, refrigeration and heating equipment such as window air conditioners; central air conditioning units; commercial refrigeration equipment; and gas, oil and electric warm air furnaces. A technician also troubleshoots and performs service and repairs on household refrigerators, freezers, dehumidifiers, window air conditioners, central air conditioning units, commercial refrigeration units and warm air heating systems.

Duty 1 Installing Refrigeration and Air Conditioning Equipment

- 1 Install window air conditioner
- 2 Install central air conditioner
- 3 Install self contained commercial refrigeration unit
- 4 Install remote condensing unit with single cabinet
- 5 Install remote commercial condensing unit with multiple cabinets

(TASK STATEMENT) I-1 INSTALL WINDOW AIR CONDITIONER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK VOM AP SS II	Check power supply Check air conditioner capacity in relation to what customer expects Install unit in window and seal any openings to outside Check unit for performance, instruct customer as to proper care, maintenance and operation	Safety: Do not lift loads from a bending position. Always lift from a squatting position with back straight. Ground power equipment and use with care. Care in the use of hand tools Hazards: Potential back injury or rupture Electrical shock-burn or personal injury Injury to oneself or others
<u>DECISIONS</u> Determine mounting position frame and/or cabinet centered on the window sill	<u>CUES</u> Window mounting frame and/or cabinet can be installed in window.	<u>ERRORS</u> Air conditioner not adaptable to window design resulting in faulty or no installation.

TASK STATEMENT) I-1 INSTALL WINDOW AIR CONDITIONER

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Forces acting on a body immersed or floating in a liquid [Level] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each other's professionalism.	Rationals—Fractions Use of Numbers: (without calculation) [eyeballing floor area] Ordering—[S.T.K.] Coding—[inf. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts—Rule of thumb [approximation] Basic Geometry Skills and Concepts Knowledge of geometric relationships—Symmetry [center point] Determination of area, perimeter and diagonals of polygons with more than 4 sides. Basic Arithmetic Skills and Concepts—Property of comparison Basic Measurement Skills and Concepts Instruments—[tape] Measurement: Geometric Linear Area Reading and interpreting tables, charts, and graphs—[capacity chart]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Speaking Writing	Instructions Position of mounting frame Verbal instructions Service order	Process Report Visual Analysis Terminology/General Vocabulary Clarity of Expression Informational report Terminology Clarity of expression

(TASK STATEMENT) 1-2 INSTALL CENTRAL AIR CONDITIONER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK Concrete forms Mixing pan SS-II VOM AP MG	Form concrete pad for condensing unit and install Install cooling coil Hook up suction and liquid lines from condensing unit to evaporator coil Install power supply and revamp low voltage circuitry if necessary Check system and instruct customer	Safety: Do not lift loads from a bending position. Always lift from a squatting position with back straight. Ground power equipment and use with care. Care in the use of hand tools Hazards: Potential back injury or rupture Electrical shock, burn or personal injury Injury to oneself or others
<u>DECISIONS</u> Determine location for condensing unit pad. Determine position of cooling coil in furnace plenum	<u>CUES</u> Survey premises for adequate power supply and proper size unit	<u>ERRORS</u> Inadequate utilities or improper size unit resulting in faulty installation

(TASK STATEMENT) I-2 INSTALL CENTRAL AIR CONDITIONER

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Forces acting on a body immersed or floating in a liquid [Level] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rationals—Fractions Use of Numbers: (without calculation) [eyeballing floor area] Ordering—[S.T.K.] Coding—[mfg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts—Rule of thumb [approximation] Basic Geometry Skills and Concepts Knowledge of geometric relationships—Symmetry [center point] Determination of area, perimeter and diagonals of polygons with more than 4 sides. Basic Arithmetic Skills and Concepts Basic Measurement Skills and Concepts Instruments—[tape] Measurement: Geometric Linear Area Reading and interpreting tables, charts, and graphs—[capacity chart]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Speaking Writing	Instructions Survey premises Verbal instructions Service order	EXAMPLES	
		SKILLS/CONCEPTS Process report Visual analysis Terminology/General Vocabulary Clarity of expression Informational report Terminology Clarity of expression	

I-3 INSTALL SELF-CONTAINED COMMERCIAL (TASK STATEMENT) REFRIGERATION UNIT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
STK MG	Level equipment and attach manifold and gauges Connect to power supply Operate unit and record pressures and temperatures	Safety: Do not lift loads from a bending position. Always lift from a squatting position with back straight. Ground power equipment and use with care. Care in the use of hand tools Hazards: Potential back injury or rupture Electrical shock, burn or personal injury Injury to oneself or others
<u>DECISIONS</u> Determine positions of equipment Determine adequate power supply	<u>CUES</u> Survey shows adequate power supply and location of equipment	<u>ERRORS</u> Equipment set up without proper checks could result in faulty operation of unit

I-3 INSTALL SELF-CONTAINED COMMERCIAL (TASK STATEMENT) REFRIGERATION UNIT

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Forces acting on a body immersed or floating in a liquid [Level] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Use of Numbers: (without calculation) [eyeballing floor area] Ordering—[S. T. K.] Coding—[mfg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts—Rule of thumb [approximation] Basic Geometry Skills and Concepts Knowledge of geometric relationships—Symmetry [center point] Determination of area, perimeter and diagonals of polygons with more than 4 sides. Basic Arithmetic Skills and Concepts—Property of comparison Basic Measurement Skills and Concepts Instruments—[tape] Measurement: Geometric Linear Area Reading and interpreting tables, charts, and graphs—[capacity chart]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Speaking Writing	Instructions Survey premises Verbal instructions Service order	EXAMPLES	SKILLS/CONCEPTS Process report Visual analysis Terminology/General Vocabulary Clarity of expression Informational report Terminology Clarity of expression

I-4 INSTALL REMOTE COMMERCIAL CONDENSING (TASK STATEMENT) UNIT WITH SINGLE CABINET

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG SS-5-6-7-10-12-13-14- SS-15 or SS-16 according to unit design SS-25 SS-26	Connect suction and liquid line installing, moisture indicator, sight glass and drier Connect power supply Evacuate and charge system Check pressures and temperatures Instruct customer—care operation	Safety: Do not lift loads from a bending position. Always lift from a squatting position with back straight Ground power equipment and use with care Always wear goggles when handling refrigerants and use care Care and use of hand tools Hazard: Potential back injury or rupture Electrical shock-burn or personal injury Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine location of condensing unit. Set refrigeration equipment in desired location.	<u>CUES</u> Survey premises for logical placement of condensing unit and adequate power supply.	<u>ERRORS</u> Failure to perform standard procedures could result in faulty unit operation

I-4 INSTALL REMOTE COMMERCIAL CONDENSING (TASK STATEMENT) UNIT WITH SINGLE CABINET

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [Refrigerant] Fluids under pressure [Refrigerant under pressure] Forces acting on a body immersed or floating in a liquid [Level] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rationals—Fractions Use of Numbers: (without calculation) [eyeballing floor area] Ordering—[S, T, K.] Coding—[img. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts—Rule of thumb [approximation] Basic Geometry Skills and Concepts Knowledge of geometric relationships—Symmetry [center point] Determination of area, perimeter and diagonals of polygons with more than 4 sides. Basic Arithmetic Skills and Concepts—Property of comparison Basic Measurement Skills and Concepts Instruments—[tape] Measurement: Geometric Linear Area Reading and interpreting tables, charts, and graphs—[capacity chart]	COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS	
Reading Viewing Speaking Writing	Instructions Survey premises Verbal instructions Service order	Process report Visual analysis Terminology/General Vocabulary Clarity of expression Informational report Terminology Clarity of expression	

(TASK STATEMENT) I-5 INSTALL REMOTE COMMERCIAL CONDENSING UNIT WITH MULTIPLE CABINETS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG SS-5-6-7-10-12-12-14 SS-15 or SS-16 according to unit design SS-25 SS-26	Connect suction and liquid lines with hand valves to each evaporator. Install drier, sight glass and moisture indicator Connect power supply Evacuate and recharge Check pressures and temperature Instruct customer in care operation	Safety: Do not lift loads from a bending position. Always lift from a squatting position with back straight Ground power equipment and use with care Always wear goggles when handling refrigerants and use care Care and use of hand tools Hazard: Potential back injury or rupture Electrical shock, burn or personal injury Injury to eyes or skin burn Injury to oneself or others
DECISIONS Determine location of condensing unit and cabinets	CUES Survey premises logical placement of equipment. Check for adequate power supply	ERRORS Failure to perform standard tasks would result in inefficient or no operation.

I-5 INSTALL REMOTE COMMERCIAL CONDENSING UNIT (TASK STATEMENT) WITH MULTIPLE CABINETS

(TASK STATEMENT) WITH MULTIPLE CABINETS		MATH — NUMBER SYSTEMS	
SCIENCE		Rationals—Fractions Use of Numbers: (without calculation) [eyeballing floor area] Ordering—[S.T.K.] Coding—[mig. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts—Rule of thumb [approximation] Basic Geometry Skills and Concepts Knowledge of geometric relationships—Symmetry [center point] Determination of area, perimeter and diagonals of polygons with more than 4 sides. Basic Arithmetic Skills and Concepts—Property of comparison Basic Measurement Skills and Concepts Instruments—[tape] Measurement: Geometric Linear Area Reading and interpreting tables, charts, and graphs—[capacity chart]	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [Refrigerant] Fluids under pressure [refrigerant under pressure] Forces acting on a body immersed or floating in a liquid [Level] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.		COMMUNICATIONS	
PERFORMANCE MODES		EXAMPLES	
Reading Viewing Speaking Writing		Instructions Survey premises Verbal instructions Service order	
		SKILLS/CONCEPTS	
		Process report Visual analysis Terminology General Vocabulary Clarity of expression Informational report Terminology Clarity of expression	

Duty II Troubleshooting Refrigeration and Air Conditioning Equipment

- 1 Hook hermetic compressor directly to power supply
- 2 Check circuitry of the compressor protector and relay
- 3 Check capacitor
- 4 Check circuitry of defrost system
- 5 Check circulation fan motors
- 6 Check and adjust control thermostat
- 7 Attach manifold and gauges to service valves and check pressures
- 8 Install in-line service valves and measure pressures
- 9 Check compressor efficiency
- 10 Locate leak in a refrigeration system using electronic leak detector
- 11 Locate leak in a refrigeration system using halide torch
- 12 Locate leak in a refrigeration system using bubble method
- 13 Check unit operation—oil level—sight glass—moisture indicator
- 14 Check and adjust an automatic expansion valve
- 15 Check, test and adjust thermostatic expansion valve
- 16 Check and adjust pressure motor control
- 17 Check and adjust low pressure safety control
- 18 Check and adjust high pressure safety control
- 19 Adjust and calibrate oil pressure control
- 20 Check ice maker for operation
- 21 Check and adjust water valve
- 22 Check hot gas defrost solenoid and valve
- 23 Check humidity with sling psychrometer
- 24 Check and adjust humidistat
- 25 Check condensate pump and drain
- 26 Check blower assembly and filter
- 27 Check heat pump reversing system
- 28 Check system for burnout and install cleanup kit
- 29 Service electronic air cleaner

II-1 HOOK HERMETIC COMPRESSOR DIRECTLY
(TASK STATEMENT) TO POWER SUPPLY

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK CS WM	Hook up CS Hook up watt meter Start compressor and observe wattage readings	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Isolate compressor Determine compressor wattage	<u>CUES</u> Compressor starts and cuts out Compressor runs hot	<u>ERRORS</u> Failure to do so would result in faulty diagnosis

II-1 HOOK HERMETIC COMPRESSOR DIRECTLY (TASK STATEMENT) TO POWER SUPPLY

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Magnetic fields of force Resistance of materials to flow of electrical current Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits. [CS WM] Basic Logic Deductive Inductive—[Deductive diagnosis]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	CS WM CS WM Service Order	EXAMPLES	SKILLS/CONCEPTS Detail inference Visual analysis Detail inference Informational report Terminology Clarity of expression

II-2 CHECK CIRCUITRY OF THE COMPRESSOR, (TASK STATEMENT) PROTECTOR AND RELAY

25

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK VOM-Watt meter Wiring Diagram	Isolate circuitry of compressor circuit on wiring diagram Check power supply Check continuity on compressor terminals, protector and relay	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine defective circuit by probing each integral part independently	<u>CUES</u> Unit does not run Unit starts and stops	<u>ERRORS</u> Improper use of the rules of checking continuity will result in inaccurate reading and diagnosis

II-2 CHECK CIRCUITRY OF THE COMPRESSOR, (TASK STATEMENT) PROTECTOR AND RELAY

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Magnetic fields of force Resistance of materials to flow of electrical current Effect of heating and cooling on expansion of materials [bi metal] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding—[mfg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Instruments Given an instrument of measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance Reading and interpreting tables, charts, and graphs Representational graphs— [wiring diagram] Basic Logic Deductive Inductive— [Deductive Diagnosis]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	Schematic VOM-Continuity Components/ Wiring Diagram Service Order	EXAMPLES SKILLS/CONCEPTS Terminology Wiring diagram Detail/inference Visual analysis Logic Recognition of symbols Informational report Terminology Clarity of expression	

(TASK STATEMENT) II-3 CHECK CAPACITOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK Capacitor Analyzer	Remove capacitor Check capacitor Replace if defective	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine capacitor for open, short or proper rating in microfarads	<u>CUES</u> Visual observation or improper reading determines faulty capacitor	<u>ERRORS</u> Improper use of analyzer or not accounting for power factor would result in improper diagnosis

(TASK STATEMENT) II-3 CHECK CAPACITOR

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Resistance of materials to flow of electrical current [flow of current thru capacitor] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which should always be avoided. at hand, Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance: [CA] Basic Logic: Deductive/ Inductive [deductive diagnosis]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	CA CA Service Order	EXAMPLES	SKILLS/CONCEPTS Detail inference Detail inference Informational report Terminology Clarity of expression

(TASK STATEMENT) II-4 CHECK CIRCUITRY OF DEFROST SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
STK VOM Wiring Schematic	Isolate circuitry of defrost system on wiring schematic Locate terminal board and identify each terminal coding, each component Check continuity of timer circuit, heater circuit and defrost terminator circuit	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine defective circuit by probing each intergal circuit independently	<u>CUES</u> Defective circuit found when no continuity appears	<u>ERRORS</u> Improper use of the rules of checking continuity will result in inaccurate reading and diagnosis

(TASK STATEMENT) II-4 CHECK CIRCUITRY OF DEFROST SYSTEM

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bi metal thermostat] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between the pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which should always be avoided. at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation)— Coding—given a coding system, recognize and identify each unit involved by assigning necessary symbols, numerical or literal Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs—[wiring diagram] Instruments—[VOM] Basic Logic—Deductive/ Inductive—[Deductive diagnosis]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Schematic VOM-Continuity Components/ Wiring diagram Service order	Terminology Wiring diagram Detail/inference Visual analysis Logic Recognition of symbols Informational report Terminology Clarity of expression

(TASK STATEMENT) II-5 CHECK CIRCULATION FAN MOTORS

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK VOM Wiring Diagram	Check power supply to motor Check continuity Check for defective bearings	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine if motor is defective Determine open circuit to motor	<u>CUES</u> Motor does not run Motor hums Motor noisy	<u>ERRORS</u> If proper rules of checking continuity are not followed, it will result in an inaccurate diagnosis

(TASK STATEMENT) IL-5 CHECK CIRCULATION FAN MOTORS

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Magnetic fields of force Resistance of materials to flow of electrical current Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.		Rational Numbers Fundamental Operations (Calculation) Additional algorithm Subtraction algorithm Basic Measurement Skills and Concepts Instruments: Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance—[VOM] Reading and interpreting tables, charts, and graphs—Representational graphs [Wiring Diagram] Basic Logic—Deductive/ Inductive [DD]	
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing		EXAMPLES Schematic VOM-Continuity Components/ Wiring Diagram Service Order	
		SKILLS/CONCEPTS Terminology Wiring diagram Detail/inference Visual analysis Logic Recognition of symbols Informational report Terminology Clarity of expression	

(TASK STATEMENT) II-6 CHECK AND ADJUST CONTROL THERMOSTAT

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK TT	Check cut in and cut out temperatures Check controls Adjust Remove, and replace	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine if control can be adjusted or must be replaced Determine cut in and cut out settings according to mfg.'s specifications	<u>CUES</u> Compressor does not run Compressor runs all the time Compressor runs too much Refrigerator experiences erratic temperatures	<u>ERRORS</u> Improper adjustments will result in improper temperatures and possible food spoilage

(TASK STATEMENT) II-6 CHECK AND ADJUST CONTROL THERMOSTAT

SCIENCE	MATH - NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [Refrigerant under pressure in power tube] Effect of heating and cooling on expansion of materials [Expansion of power tube] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers; (without calculation) Coding [Mfg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts - [TT] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive [Diagnosis]
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Thermister thermometer Control adjustment Service order
SKILLS/CONCEPTS Detail inference Visual analysis Informational report Terminology Clarity of expression	

II-7 ATTACH MANIFOLD AND GAUGES TO SERVICE
(TASK STATEMENT) VALVES AND CHECK PRESSURES

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Attach hose connections Open valve stem	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine between the high and low side valves	<u>CUES</u> Locate low side valve and high side valve	<u>ERRORS</u> Failure to attach gauges to the right valve will result in inadequate readings and possible damage to gauge

**II-7 ATTACH MANIFOLD AND GAUGES TO SERVICE
(TASK STATEMENT) VALVES AND CHECK PRESSURES**

(TASK STATEMENT) VALVES AND CHECK PRESSURES		MATH – NUMBER SYSTEMS	
SCIENCE		Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic [DD] Deductive Inductive	
Fluids under pressure [Refrigerant] Simple machines used to gain mechanical advantage [STK] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.		COMMUNICATIONS	
PERFORMANCE MODES		EXAMPLES	
Reading Viewing Writing		MG MG Service order	
SKILLS/CONCEPTS		Detail inference Detail inference Informational report Terminology Clarity of expression	

II-8 INSTALL IN-LINE SERVICE VALVES AND MEASURE PRES-

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(TASK STATEMENT) SURES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MCG SS-19	Clean area of tubing where valve will be installed Install valve	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine what is suction side or low side and high side	<u>CUES</u> Locate lines (large one, low side—smaller one, high side) or trace lines back from compressor	<u>ERRORS</u> Failure to identify valves on proper lines would result in obtaining wrong gauge reading, possible damage to gauges

II-8 INSTALL IN-LINE SERVICE VALVES AND MEASURE PRES-

(TASK STATEMENT) SURES

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [Refrigerant] Property of comparison [measure pressures] Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive [DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	MG MG Service Order	Detail inference Detail inference Informational report Terminology Clarity of expression

(TASK STATEMENT) II-9 CHECK COMPRESSOR EFFICIENCY

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG WM	Install manifold and gauges Install watt meter Start unit and observe gauge reading and watt meter reading	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine compressor operation by wattage check Determine compressor operation by compression	<u>CUES</u> Long running time of compressor Erratic system temperatures	<u>ERRORS</u> Failure to make proper checks would result in complaint not being satisfied

(TASK STATEMENT) II-9 CHECK COMPRESSOR EFFICIENCY

SCIENCE	MATH — NUMBER SYSTEMS
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding—[nfg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG and WM] Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/ Inductive—[DD]
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Viewing Writing	<u>EXAMPLES</u> MG WM MG WM Service order <u>SKILLS/CONCEPTS</u> Detail inference Detail inference Informational report Terminology Clarity of expression

II-10 LOCATE LEAK IN REFRIGERATION SYSTEM USING (TASK STATEMENT) ELECTRONIC LEAK DETECTOR

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG ELD SS-15 or SS-16 according to manufacturer's specification	Fill system with type of refrigerant used in system Probe suspected areas with sensor of leak detector	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine probable area of leak	<u>CUES</u> Locate leak when signal is detected from detector	<u>ERRORS</u> Improper calibration of sensitivity control or failure to use search and pinpoint correctly, results in mistaken leak.

II-10 LOCATE LEAK IN REFRIGERATION SYSTEM USING (TASK STATEMENT) ELECTRONIC LEAK DETECTOR

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat transfer evaporator to condenser] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.		Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG and ELD] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/ Inductive—[DD]	
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Listening Writing	MG MG ELD Service order	EXAMPLES	SKILLS/CONCEPTS Detail inference Detail inference Noise discrimination Sensor siren Informational report Terminology Clarity of expression

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II-11 LOCATE LEAK IN REFRIGERATION SYSTEM **(TASK STATEMENT) USING HALIDE TORCH**

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG HLD SS-15 or SS-16 according to mfg's specifications	Fill system with type of refrigerant used in system Probe suspected areas with halide torch	Safety Always wear goggles and use care when handling refrigerants Proper ventilation is a necessary precaution when checking with a HLD Hazard Injury to eyes or skin burn Irritating odor to nose and throat
DECISIONS Determine probable area of leak	CUES Detects leak when flame changes to a bright blue color	ERRORS If improper flame color is mistaken for leak; leak would not be detected

II-11 LOCATE LEAK IN REFRIGERATION SYSTEM (TASK STATEMENT) USING HALIDE TORCH

SCIENCE		MATH – NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat transfer evaporator to condenser] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG and HLD] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive—[DD]		
COMMUNICATIONS			
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS	
Reading Viewing Writing	MG HLD Service order	Detail inference Color discrimination (flame changes color) Informational report Terminology Clarity of expression	

II-12 LOCATE LEAK IN REFRIGERATION SYSTEM USING (TASK STATEMENT) BUBBLE METHOD

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG SS-17	Fill system with Nitrogen Swab joints and other possible areas where leaks occur	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine probable area of leak	<u>CUES</u> Detects leak when bubble occurs	<u>ERRORS</u> Failure to isolate possible source of leak, results in more time and expense required to locate source

II-12 LOCATE LEAK IN REFRIGERATION SYSTEM USING (TASK STATEMENT) BUBBLE METHOD

SCIENCE	MATH - NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat transfer evaporator to condenser] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] [MC] Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive [DD]
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Viewing Writing	<u>EXAMPLES</u> MG Bubble solution swabbed on leak determines area of leak Service order <u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Informational report Terminology Clarity of expression

**II-13 CHECK UNIT OPERATION—OIL LEVEL—SIGHT GLASS—
(TASK STATEMENT) MOISTURE INDICATOR**

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK AP	Inspect Check power supply	Safety Use care in checking power supply Care in use of hand tools Hazard Severe shock may occur Injury to oneself or others
<u>DECISIONS</u> Determine proper oil level, clear sight glass, and color on moisture indicator pad in dry zone	<u>CUES</u> Locate, oil level, sight glass in separator or compressor base. Sight glass and moisture indicator in liquid line.	<u>ERRORS</u> Failure to check out properly could result in a repair to be over looked

**II-13 CHECK UNIT OPERATION—OIL LEVEL—SIGHT GLASS—
(TASK STATEMENT) MOISTURE INDICATOR**

SCIENCE		MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat transfer evaporator to condenser] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only int. those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Uses of Numbers: (without calculation) Coding—[mfg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion Basic Measurement Skills and Concepts—[AP] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive—[DD]	
PERFORMANCE MODES		COMMUNICATIONS
Reading Viewing Writing	EXAMPLES AP Oil level Sight glass Moisture indicator Service order	SKILLS/CONCEPTS Detail inference Visual analysis Informational report Terminology Clarity of expression

II-14 CHECK AND ADJUST AN AUTOMATIC EXPANSION (TASK STATEMENT) VALVE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Inspect expansion valve for ice buildup Check adjustment in relation to low side pressure	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Adjust valve stem clockwise to increase pressure, counter clockwise to decrease pressure to record desired low side pressure	<u>CUES</u> Normal low side pressures will be recorded	<u>ERRORS</u> Failure to follow the proper adjustment technique would result in faulty performance

II-14 CHECK AND ADJUST AN AUTOMATIC EXPANSION (TASK STATEMENT) VALVE

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat transfer evaporator to condenser] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/ Inductive—[DD]
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Writing	EXAMPLES MG Automatic expansion valve Service order
	SKILLS/CONCEPTS Detail inference Visual analysis Informational report Terminology Clarity of expression

**II-15 CHECK, TEST AND ADJUST THERMOSTATIC
(TASK STATEMENT) EXPANSION VALVE**

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG (Element tube check/ used in conjunction with R-12-R-22)	Check power element using element tube check and record pressures Adjust to 10" superheat Replace if necessary Check pressures for normal operation	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u>	<u>CUES</u>	<u>ERRORS</u>
Determine if TEV is defective or out of adjustment	Normal low side temperatures and pressure will be recorded	Failure to diagnose problem accurately, would result in replacing part unnecessarily

II-15 CHECK, TEST AND ADJUST THERMOSTATIC (TASK STATEMENT) EXPANSION VALVE

SCIENCE		MATH – NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat trans] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] [MG] Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive [DD]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	MG TEV Service order	EXAMPLES	SKILLS/CONCEPTS Detail inference Visual analysis Informational report Terminology Clarity of expression

(TASK STATEMENT) II-16 CHECK AND ADJUST PRESSURE MOTOR CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Check gauge readings Check differential and raise settings Check cut-in and cut-out settings Make necessary adjustments	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine control adjustments to mfg specifications	<u>CUES</u> Correct control settings will provide for normal run time and down time	<u>ERRORS</u> Failure to meet all adjustment requirements would result in short cycle or an extended run cycle

(TASK STATEMENT) II-16 CHECK AND ADJUST PRESSURE MOTOR CONTROL

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of materials [effect of refrigerant on bellows] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive—[DD]
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Viewing Writing	<u>EXAMPLES</u> MG Control adjustments Service order
	<u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Informational report Terminology Clarity of expression

(TASK STATEMENT) II-17 CHECK AND ADJUST LOW PRESSURE SAFETY CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Check gauge readings Check differential and range adjustments Check cut-in and cut-out points Make necessary adjustments	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine adjustments according to mfg specifications	<u>CUES</u> If control is functioning compressor will operate and low side pressures will be normal	<u>ERRORS</u> Failure to recognize low side operating pressures or make incorrect adjustments would cause compressor damage and poor system performance

(TASK STATEMENT) II-17 CHECK AND ADJUST LOW PRESSURE SAFETY CONTROL

SCIENCE	MATH – NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of materials [bellows assembly] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers. Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/ Inductive—[DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	MG Control adjustments Service order	Detail inference Visual analysis Detail inference Informational report Terminology Clarity of expression

(TASK STATEMENT) II-18 CHECK AND ADJUST HIGH PRESSURE SAFETY CONTROL

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Check gauge readings Check differential and range adjustments Check cut-in and cut-out points Make necessary adjustments	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine control adjustments to mfg. specifications	<u>CUES</u> If control is functioning compressor will operate and high side pressures will be normal	<u>ERRORS</u> Failure to recognize high side operating pressures or make incorrect adjustments would create short cycling and inefficient performance

(TASK STATEMENT) II-18 CHECK AND ADJUST HIGH PRESSURE SAFETY CONTROL

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of materials [expansion of bellows] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/ Inductive—[DD]
COMMUNICATIONS	SKILLS/CONCEPTS
<u>PERFORMANCE MODES</u> Reading Viewing Writing	<u>EXAMPLES</u> MG MG Service order <u>SKILLS/CONCEPTS</u> Detail inference Detail inference Informational report Terminology Clarity of expression

(TASK STATEMENT) II-19 ADJUST AND CALIBRATE OIL PRESSURE SAFETY CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Install manifold and gauges Locate control Adjust and calibrate Test and check	Safety: Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard: Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine adjustments to be made according to mfg. specifications	<u>CUES</u> Unit shut-off Low oil level	<u>ERRORS</u> Improper adjustment and calibration may result in unit malfunction

(TASK STATEMENT) II-19 ADJUST AND CALIBRATE OIL PRESSURE SAFETY CONTROL

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of materials [expansion of bellows] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding—[mig. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Basic Measurement Skills and Concepts Instruments—[MG] Measurement: Non-geometric Liquid Weight Liquid—[effect of refrigerant on control] Basic Logic Deductive/ Inductive—[deductive diagnosis]
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Viewing Writing	<u>EXAMPLES</u> Data plate MG MG vice order <u>SKILLS/CONCEPTS</u> Detail Inference Detail Inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) II-20 CHECK ICE MAKER FOR OPERATION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
STK VOM Wiring Diagram	Check continuity of ice maker assembly Adjust assembly Remove and/or replace	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine if there is continuity through components of assembly Determine what component is in operation	<u>CUES</u> Water over flows Rotor does not revolve Cubes are not discharged from unit	<u>ERRORS</u> Failure to find nonfunctioning component would result in erratic operation of ice maker

(TASK STATEMENT) IL-20 CHECK ICE MAKER FOR OPERATION

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage. [STK] Magnetic fields of force Resistance of materials to flow of electrical current Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measure pressures] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive—[DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Schematic VOM-Continuity	Terminology Wiring diagram Detail/inference
Viewing	Components/Wiring diagram	Visual analysis Logic Recognition of symbols
Writing	Service order	Informational report Terminology Clarity of expression

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(TASK STATEMENT) II-21 CHECK AND ADJUST WATER VALVE

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG TT	Check water inlet temperature Check water outlet temperature Adjust water valve stem to correct any temperature difference	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine adjustment according to mfg. specifications	<u>CUES</u> Normal water temperatures will be maintained, allowing for operating pressures run normal	<u>ERRORS</u> Failure to make correct adjustment would result in unit operating with excessive head pressure or excessive water consumption

(TASK STATEMENT) II-21 CHECK AND ADJUST WATER VALVE

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (STK) Transfer of heat from one body to another [conduction of condenser coil to water-measuring sensible heat by thermometer] Effect of heating and cooling on expansion of materials [expansion and contraction of a bellows] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding—[mig data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts [effect of refrigerant pressure on bellows] Basic Measurements—Skills and Concepts Instruments—[thermometer] Measurement: Non-geometric Temperature Weight Liquid [refrigerant in system] Basic Logic Deductive/ Inductive—[deductive diagnosis]
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Viewing Touching Writing	<u>EXAMPLES</u> MG TT MG TT TT Service Order
	<u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Temperature Informational report Terminology Clarity of expression

(TASK STATEMENT) II-22 CHECK HOT GAS DEFROST SOLENOID AND VALVE

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK VOM	Check mechanical operation of valve Check solenoid continuity	Safety: Always disconnect circuit and lock out breaker before working on electrical components Hazard: Electrical shock - electrical burn
<u>DECISIONS</u> Determine if hot gas defrost solenoid valve is cycling Determine if defrost trip mechanism is operative	<u>CUES</u> Cooling coil has frost build-up Cooling area has higher than normal temperatures	<u>ERRORS</u> Improper diagnosis will result in continued defrost malfunction

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(TASK STATEMENT) II-22 CHECK HOT GAS DEFROST SOLENOID AND VALVE

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Instruments—[VOM] Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance Deductive/Inductive—[Deductive Diagnosis]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Schematic VOM-Continuity	Terminology Wiring diagram Detail/inference
Viewing	Components/Wiring diagram	Visual analysis Logic Recognition of symbols
Writing	Service order	Informational report Terminology Clarity of expression

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(TASK STATEMENT), II-23 CHECK HUMIDITY WITH SLING PSYCHROMETER

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
SP Distilled water	Operate sling psychrometer Record readings in several locations Record outside readings	
<u>DECISIONS</u> Determine humidity conditions	<u>CUES</u> To record a reading of 50-55°F relative humidity	<u>ERRORS</u> Inaccurate reading could result in improper diagnosis— unit too small

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(TASK STATEMENT) II-23 CHECK HUMIDITY WITH SLING PSYCHROMETER

SCIENCE		MATH — NUMBER SYSTEMS	
Effect of heating and cooling on state of matter [humidity effect on element] Resistance of materials to change in shape [Hydroscopic element expanding & contracting (stretching)] Effect of heating and cooling on expansion of materials [Spirit thermometers] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Property of comparison—[measurement of psychrometer scale] Basic Measurement Skills and Concepts Instruments—[psychrometer] Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance—[psychrometer and instrument of measure] Measurement: Non-geometric [thermometers in psychrometer]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Touch Writing	SP Thermometers in SP Service order	<u>EXAMPLES</u>	<u>SKILLS/CONCEPTS</u> Detail inference Temperature Informational report Terminology Clarity of expression

(TASK STATEMENT) II-24 CHECK AND ADJUST HUMIDISTAT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Locate control Check hydroscopic element Adjust Test	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine control needs adjustment or replacement	<u>CUES</u> Too much humidity in warm season Dryness in cold season	<u>ERRORS</u> Failure to make proper adjustment or placement will cause uncomfortable air conditioning conditions

(TASK STATEMENT) II-24 CHECK AND ADJUST HUMIDISTAT

SCIENCE Simple machines used to gain mechanical advantage [STK] Hydroscopic element expands and contracts due to moisture in air Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.		MATH — NUMBER SYSTEMS Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Logic Deductive Inductive—[deductive diagnosis]
COMMUNICATIONS		
PERFORMANCE MODES Viewing Writing	EXAMPLES Humidistat Service order	SKILLS/CONCEPTS Visual analysis Informational report Terminology Clarity of expression

(TASK STATEMENT) II-25 CHECK CONDENSATE PUMP AND DRAIN

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
STK VOM	Check power supply to pump motor Check motor for continuity Check or adjust mechanical float and arm for proper level Inspect drain	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine if pump or motor are faulty or drain plugged	<u>CUES</u> Motor does not run Motor runs but does not pump	<u>ERRORS</u> Failure to make proper test and adjustment will result in excessive water build-up in condensate tray

(TASK STATEMENT) II-25 CHECK CONDENSATE PUMP AND DRAIN

SCIENCE		MATH - NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Magnetic fields of force Resistance of materials to flow of electrical current Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which, pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Piling and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. [VUM] Basic Logic Deductive Inductive [DD]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	Schematic VOM-Continuity Components/Wiring diagram Service order	<u>EXAMPLES</u> <u>SKILLS/CONCEPTS</u> Terminology Wiring diagram Detail/inference Visual analysis Logic Recognition of symbols Informational report Terminology Clarity of expression	

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(TASK STATEMENT) II-26 CHECK BLOWER ASSEMBLY AND FILTER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK VOM	Check filter Check power supply if blower motor is inoperative. Check and adjust belt Check motor bearings and oil Replace any defective components	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine if malfunction is mechanical or electrical Determine blower assembly specifications according to mfg. specifications	<u>CUES</u> No heat or cooling Noisy Temperatures too high or too low	<u>ERRORS</u> Failure to make proper diagnosis would result in replacing unnecessary parts and/or not solving the complaint

(TASK STATEMENT) II-26 CHECK BLOWER ASSEMBLY AND FILTER

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Magnetic fields of force Resistance of materials to flow of electrical current Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Functional Operations (Calculation) Additional algorithm Subtraction algorithm Basic Measurement Skills and Concepts Instruments: Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.—[VOM] Reading and interpreting tables, charts, and graphs—Representational graphs [Wiring Diagram] Basic Logic—Deductive/Inductive [DD]		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	Schematic VOM-continuity Components/Wiring diagram Service order	<u>EXAMPLES</u> <u>SKILLS/CONCEPTS</u> Terminology Wiring diagram Detail/inference Visual analysis Logic Recognition of symbols Informational report Terminology Clarity of expression	

(TASK STATEMENT) II-27 CHECK HEAT PUMP REVERSING SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK VOM MG	Check thermostat circuit to solenoid valves Check operation of reversing and check valves Check system pressures Remove and replace any defective component according to mfg. specifications	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine if reversing valves are manual or electrically operated Determine type of system according to mfg's specifications	<u>CUES</u> Unit runs—no heat Unit runs—no cooling	<u>ERRORS</u> Failure to properly identify proper reversing system would result in improper diagnosis and repair

TASK STATEMENT) IL-27 CHECK HEAT PUMP REVERSING SYSTEM

SCIENCE		MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straightforward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others feelings.	Rational Numbers Uses of Numbers: (without calculation) Coding—(mfg data plate) Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—(refrigerant) Property of comparison—(measuring) Basic Measurement Skills and Concepts—(MG and WM) Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance Basic Logic Deductive/Inductive—(DD)		
COMMUNICATIONS			
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS	
Reading Viewing Writing	MG VOM Service order	Detail inference Informational report Terminology Clarity of expression	

II-28 CHECK SYSTEM FOR BURNOUT AND INSTALL CLEANUP

(TASK STATEMENT) KIT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK System cleaner (Sporlan) Acid test kit	Remove compressor Install replacement compressor, system cleaner and drier Evacuate Recharge Test oil for color and acidity Remove system cleaner	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine if burnout has occurred by following the electrical tests recommended by the equipment mfg. Determine size of unit and the proper cleaning procedure to be used.	<u>CUES</u> Compressor inoperative No refrigeration	<u>ERRORS</u> Failure to determine if a burnout has occurred, and a new compressor is installed without proper cleanup will result in future system and compressor failure

II-28 CHECK SYSTEM FOR BURNOUT AND INSTALL CLEANUP (TASK STATEMENT) KIT

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	Data plate MG MG Service order	<u>EXAMPLES</u>	<u>SKILLS/CONCEPTS</u> Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) II-29 SERVICE ELECTRONIC AIR CLEANER

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK VOM	Check power supply and disconnect Remove filters and clean Replace any defective component according to mfg's specifications	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine what type electronic air cleaner is installed on system If self cleaning, check water supply	<u>CUES</u> Customer discomfort Air has high rate of pollen, dust Unit not functioning properly—short cycling	<u>ERRORS</u> Failure to determine what type is installed would result in improper service or needless replacement of components

3 (TASK STATEMENT) II-29 SERVICE ELECTRONIC AIR CLEANER

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism	Rational Numbers Uses of Numbers: (without calculation)— Coding—given a coding system, recognize and identify each unit involved by assigning necessary symbols, numerical or literal Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs—[wiring diagram] Instruments—[VOM] Basic Logic—Deductive/Inductive—[Deductive diagnosis]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Schematic VOM-Continuity Components/Wiring Diagram Service order	Terrainology Wiring diagram Detail/inference Visual analysis Logic Recognition of symbols Informational report Terminology Clarity of expression

Duty III Servicing and Repairing Refrigeration and Air Conditioning Equipment

- 1 Evacuate a refrigeration system
- 2 Pump system down into receiver tank
- 3 Recharge system using sight glass
- 4 Recharge system weighing in refrigerent
- 5 Fill dial a charge
- 6 Recharge a refrigeration system using dial a charge
- 7 Remove and replace control thermostat
- 8 Remove and replace defrost timer
- 9 Remove and replace motor overload protector
- 10 Remove and replace capacitor
- 11 Remove and replace defrost heater
- 12 Remove and replace defrost terminator
- 13 Remove and replace relay
- 14 Remove and replace fan motors
- 15 Repair leak in copper lines of system
- 16 Remove and replace compressor
- 17 Add oil to system
- 18 Remove restriction from capillary tube
- 19 Remove and replace capillary tube
- 20 Remove and replace automatic expansion valve
- 21 Remove and replace thermostatic expansion valve
- 22 Install a drier, sight glass or moisture indicator
- 23 Remove and replace high or low pressure safety control
- 24 Remove and replace high or low pressure motor control
- 25 Remove and replace oil pressure safety control
- 26 Remove and replace hot gas defrost solenoid and valve
- 27 Repair evaporator with epoxy
- 28 Remove and replace condensation pump motor
- 29 Remove and replace humidistat
- 30 Balance the air conditioning system

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(TASK STATEMENT) III-1 EVACUATE A REFRIGERATION SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Set of Standard Tools Vacuum pump Manifold and gauge	Run pump until gauge reads and holds at 29.9" vacuum	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Attach vacuum pump and evacuate system	<u>CUES</u> Remove all contaminants and moisture	<u>ERRORS</u> Failure to completely evacuate the system would result in possible inefficient cooling when recharged

(TASK STATEMENT) III-1 EVACUATE A REFRIGERATION SYSTEM

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate MG MG Service order
SKILLS/CONCEPTS	
Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression	

(TASK STATEMENT) III-2 PUMP SYSTEM DOWN INTO RECEIVER TANK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Locate receiver tank close valve to liquid line Start unit Observe gauges Close suction service valve	Safety: Proper care and use of hand tools Hazard: Personal injury could occur
<u>DECISIONS</u> Determine how to evacuate system to isolate component for repair	<u>CUES</u> Component must be changed System must be evacuated	<u>ERRORS</u> Failure to properly evacuate system would result in possible loss of refrigerant or exposing system to moisture

(TASK STATEMENT) III-2 PUMP SYSTEM DOWN INTO RECEIVER TANK

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure, to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straightforward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	MG MG Service order	Detail inference Detail inference Informational report Terminology Clarity of expression

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(TASK STATEMENT) III-3 RECHARGE SYSTEM USING SIGHT GLASS

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Set of Standard Tools Manifold and gauges Tank of refrigerant 12 or 22 (as specified for unit)	Evacuate system Start unit Observe pressures Observe refrigerant flow through sight glass.	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Attach tank to low side and charge in vapor form	<u>CUES</u> To charge the system by observing the sight glass until it clears	<u>ERRORS</u> Failure to follow the prescribed method of charging with vapor with the unit running, would cause damage to the compressor

(TASK STATEMENT) III-3 RECHARGE SYSTEM USING SIGHT GLASS

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive [DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-4 RECHARGE A SYSTEM WEIGHING IN REFRIGERANT

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Set of Standard Tools Manifold and gauges Tank of refrigerant (as specified for unit) Scale	Evacuate system Purge line from tank to manifold Obtain total weight of tank Observe what the total weight should be with full charge in system	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine charge until specified amount is taken into system	<u>CUES</u> Charge the system with refrigerant by measuring in the correct weight as found on the mfg. name plate located on the unit	<u>ERRORS</u> Miscalculation could result in under charge or over charge affecting performance of unit

(TASK STATEMENT) III-4 RECHARGE A SYSTEM WEIGHING IN REFRIGERANT

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion — [refrigerant] Property of comparison — [measuring] Basic Measurement Skills and Concepts — [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive — [DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-5 FILL DIAL A CHARGE

OFF

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
DC SS-15 or SS-16 according to mig's specifications	Set up dial and charger to hook-up supply tank Fill charger	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine type and amount of refrigerant required	<u>CUES</u> Amount of refrigerant required Type of refrigerant required	<u>ERRORS</u> Improper amount or type would cause poor performance

TASK STATEMENT) III-5 FILL DIAL A CHARGE

SCIENCE	MATH — NUMBER SYSTEMS
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding—[mfg. Data Plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. [dial a charge]
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate DC DC Service order SKILLS/CONCEPTS Detail inference Detail inference Informational report Terminology Clarity of expression

(TASK STATEMENT) III-6 RECHARGE A REFRIGERATION SYSTEM USING DIAL A CHARGE

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Set of Standard Tools Manifold and gauges Dial a charge (filled to mfg. specified amount of refrigerant)	Evacuate system Purge line from dial a charge to manifold Start unit and observe gauges Check pressures and temperatures	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine correct charge for low side with specified amount of refrigerant	<u>CUES</u> Measure into the system the exact amount of refrigerant specified	<u>ERRORS</u> Failing to calculate the proper pressure of dial a charge and measuring scale would result in an over charge or an under charge

(TASK STATEMENT) III-6 RECHARGE A REFRIGERATION SYSTEM USING DIAL A CHARGE

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK, valve wrench] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under at. press] Transfer of heat from one body to another [heat transfer evaporator condenser] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding — [mig. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion — [refrigerant] Property of comparison — [dial a charge] Basic Measurement Skills and Concepts Instruments — [dial a charge — manifold & gauges] Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Measurement' (Non-geometric)—[refrigerant] Temperature Weight Liquid		
COMMUNICATIONS			
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS	
Reading Writing Viewing	Data plate Dial a charge Service order Dial a charge	Detail inference Informational report Terminology/general vocabulary Clarity of expression Detail inference	

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(TASK STATEMENT) III-7 REMOVE AND REPLACE CONTROL THERMOSTAT

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG	Install manifold and gauges Locate and remove control Install replacement control Check and test control	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine control in operative Select replacement according to mfg. model and serial number	<u>CUES</u> Adjustment can not be made with accuracy Power element has lost charge Open circuit	<u>ERRORS</u> Incorrect replacement will result in improper installation, and erratic cooling coil temperatures.

(TASK STATEMENT) III-7 REMOVE AND REPLACE CONTROL THERMOSTAT

SCIENCE		MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of materials [power element in thermostat] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relate to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straightforward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding—[mig. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.		
PERFORMANCE MODES		COMMUNICATIONS	
Reading Viewing Writing	Data plate MG MG Service order	<u>EXAMPLES</u> <u>SKILLS/CONCEPTS</u> Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression	

(TASK STATEMENT) III-8 REMOVE AND REPLACE DEFROST TIMER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK Wiring Diagram	Locate defrost timer Remove from mounting Install and test	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine if defrost timer is defective Select replacement timer according to unit model and serial number	<u>CUES</u> Defrost timer shorted Defrost timer has open circuit	<u>ERRORS</u> Failure to make correct replacement would result in a longer or shorter defrost cycle

(TASK STATEMENT) III-8 REMOVE AND REPLACE DEFROST TIMER

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [bi metal] Resistance of materials to flow of electrical current [motor turning timer mechanism] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers (without calculation) Coding [mfg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order	Detail inference Visual analysis Recognition of symbols, codes emblems Informational report Terminology/general vocabulary Clarity of expression

COMMUNICATIONS

(TASK STATEMENT) III-9 REMOVE AND REPLACE MOTOR OVERLOAD PROTECTOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK Wiring Diagram	Locate compressor and remove overload protector Check rating and reinstall replacement protector	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine protector defective Select proper rated protector according to mfg. specifications	<u>CUES</u> Overload protector weak Overload protector has open circuit	<u>ERRORS</u> Failure to do so could cause unit damage

(TASK STATEMENT) III-9 REMOVE AND REPLACE MOTOR OVERLOAD PROTECTOR

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [SIK] Effect of heating and cooling on expansion of materials [Bi metal] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers (without calculation) Coding [img data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order	Detail inference Visual analysis Recognition of symbols, codes emblems Informational report Terminology general vocabulary Clarity of expression

(TASK STATEMENT) III-10 REMOVE AND REPLACE CAPACITOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK Wiring Diagram	Locate motor Remove capacitor Replace with new capacitor	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine capacitor defective Select capacitor with correct mfg. rating	<u>CUES</u> Capacitor leaks Motor does not start Capacitor shorted or has open circuit	<u>ERRORS</u> Failure to do so would result in damage to motor or compressor

(TASK STATEMENT) III-10 REMOVE AND REPLACE CAPACITOR

SCIENCE	MATH - NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [SIK] Resistance of materials to flow of electrical current [flow of current] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers: (without calculation) Coding [mlg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order <u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Recognition of symbols, codes emblems Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-11 REMOVE AND REPLACE DEFROST HEATER

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK Wiring Diagram	Remove heater from cooling coil assembly Install new heater Reinstall cooling coil assembly	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine defrost heater inoperative Select defrost heater according to model and serial number	<u>CUES</u> Fresh food compartment warmer than normal Ice build-up in freezer near cooling coil	<u>ERRORS</u> Failure to select correct heater would result in not being able to replace heater

(TASK STATEMENT) III-11 REMOVE AND REPLACE DEFROST HEATER

SCIENCE	MATH — NUMBERS SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers: (without calculation) Coding [mlg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Data plate Wiring diagram	Detail inference
Viewing	Components Wiring diagram	Visual analysis Recognition of symbols, codes emblems
Writing	Service order	Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-12 REMOVE AND REPLACE DEFROST TERMINATOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
STK Wiring Diagram	Locate defrost terminator in cooling coil section Remove defrost terminator Install new defrost terminator	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine defrost terminator defective Select replacement according to model and serial number Check cut out temp on new terminator	<u>CUES</u> Defrost terminator has open circuit	<u>ERRORS</u> Failure to make correct replacement will result in a longer or shorted defrost cycle

(TASK STATEMENT) III-12 REMOVE AND REPLACE DEFROST TERMINATOR

SCIENCE	MATH – NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [bi metal] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers (without calculation) Coding (In eg. data plate) Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order	Detail inference Visual analysis Recognition of symbols, codes emblems Informational report Terminology/general vocabulary Clarity of expression

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(TASK STATEMENT) III-13 REMOVE AND REPLACE RELAY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK Wiring Diagram	Locate relay Remove relay Install relay Test and check	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determin. relay inoperative Select relay rated to HP of compressor	<u>CUES</u> Relay has open circuit Compressor starts and stops	<u>ERRORS</u> Failure to install correct size relay would render unit inoperative

(TASK STATEMENT) III-13 REMOVE AND REPLACE RELAY

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bi metal] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers: (without calculation) Coding [mig. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order
SKILLS/CONCEPTS	
Detail inference Visual analysis Recognition of symbols, codes emblems Informational report Terminology/general vocabulary Clarity of expression	

COMMUNICATIONS

(TASK STATEMENT) III-14 REMOVE AND REPLACE FAN MOTORS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK Wiring Diagram	Locate motor Remove motor Replace motor Test and check	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine motor inoperative Select motor designed for application	<u>CUES</u> Motor shorted Motor has open circuit Motor has defective bearings	<u>ERRORS</u> Failure to replace with motor designed will result in inefficient unit operation

(TASK STATEMENT) III-14 REMOVE AND REPLACE FAN MOTORS

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Magnetic fields of force Resistance of materials to flow of electrical current Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers: (without calculation) Coding — [milg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs
COMMUNICATIONS	COMMUNICATIONS
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order
SKILLS/CONCEPTS	SKILLS/CONCEPTS
Detail inference Visual analysis Recognition of symbols, codes, emblems Informational report Terminology/general vocabulary Clarity of expression	Detail inference Visual analysis Recognition of symbols, codes, emblems Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-15 REPAIR LEAK IN COPPER LINES OF SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
STK MG VP PT SS-4 SS-3 SS-7 SS-6	Repair copper line with flared mechanical fitting or with a swedge and or brazed joint Evacuate Recharge	Safety: Proper care and use of hand tools Ventilate room when its razing Use care while torch is in operation Wear goggles when handling refrigerant Hazard: Personal injury could occur Burn off irritating to eyes, nose and throat Severe burns or property damage may occur Loss of eyesight or skin burns
<u>DECISIONS</u> Determine severity of leak Determine type of fitting needed to complete task	<u>CUES</u> Oil slick in area of leak Leak detector methods have isolated area of leak	<u>ERRORS</u> Failure to determine severity of leak or make good repair would cause unit to continue leaking

(TASK STATEMENT) III-15 REPAIR LEAK IN COPPER LINES OF SYSTEM

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on state of matter [brazing] Fluids under pressure [refrigerant] Resistance of materials to change in shape [tube bending, swedge, flare] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding—[mfg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring in refrigerant charge] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive—[deductive diagnosis]
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Writing Viewing	<u>EXAMPLES</u> MG Service order MG <u>SKILLS/CONCEPTS</u> Detail inference Informational report Terminology/general vocabulary Clarity of expression Detail inference

(TASK STATEMENT) III-16 REMOVE AND REPLACE COMPRESSOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARDS
STK MG VP SS-15 or SS-16 according to mfg's specifications	Locate compressor and remove from mounting Install replacement compressor Evacuate Recharge Test and check	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine compressor defective Select replacement compressor according to mfg's specifications and model and serial number	<u>CUES</u> Compressor shorted Compressor has open winding Compressor has mechanical failure	<u>ERRORS</u> Failure to install proper sized compressor will result in no operation or ineffective operation of unit

(TASK STATEMENT) III-16 REMOVE AND REPLACE COMPRESSOR

SCIENCE	MATH – NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on state of matter [soldering] Transfer of heat from one body to another [heat conduction] Effect of heating and cooling on expansion of materials [refrigerant] Fluids under pressure [refrigerant under pressure] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding [only data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-17 ADD OIL TO SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK Manifold & gauges SS-15 or SS-16 WM Refrigeration oil	Take system to vacuum on low side Introduce oil into low side until operating wattage becomes normal or compressor quiets down Recharge	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine how much oil has been lost from compressor	<u>CUES</u> Unit runs excessively hot Unit has high wattage reading Unit short cycles	<u>ERRORS</u> Too much or too little oil will render inefficient operation of unit

(TASK STATEMENT) III-17 ADD OIL TO SYSTEM

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts [MG, WM] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	Data plate MG WM Service order MG WM	Detail inference Informational report Terminology/general vocabulary Clarity of expression Detail inference

COMMUNICATIONS

(TASK STATEMENT) III-18 REMOVE RESTRICTION FROM CAPILLARY TUBE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY -- HAZARD
STK MG VP SS-12 SS-15 or SS-17	Remove high side end of capillary tube Flush and back flush R-22 or nitrogen Install drive Evacuate Recharge	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine if capillary tube is operative	<u>CUES</u> Gauges read moderate restriction	<u>ERRORS</u> No refrigerant passes through tube

(TASK STATEMENT) III-18 REMOVE RESTRICTION FROM CAPILLARY TUBE

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on state of matter [Soldering-refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat conduction] Effect of heating and cooling on expansion of materials [refrigerant] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which always be avoided at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Fundamental Operations (Calculation) Addition; algorithm Subtraction; algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate MG MG Service order
SKILLS/CONCEPTS	
Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression	

(TASK STATEMENT) III-19 REMOVE AND REPLACE CAPILLARY TUBE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG VP	Remove capillary tube Install replacement Evacuate Recharge	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin Injury to oneself or others
<u>DECISIONS</u> Determine if capillary tube is inoperative Select correct capillary tube according to compressor capacity, and condenser design	<u>CUES</u> Evaporator pressures reflect a restriction Capillary tube plugged	<u>ERRORS</u> Failure to install correct capillary tube would result in higher or lower evaporator temperature

(TASK STATEMENT) III-19 REMOVE AND REPLACE CAPILLARY TUBE

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) coding [mlg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-20 REMOVE AND REPLACE AUTOMATIC EXPANSION VALVE

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG TT SS-15 or SS-16 according to mfg specifications	Install manifold and gauges Isolate automatic expansion valve from system Remove automatic expansion valve Replace with new automatic expansion valve Purge and add refrigerant to system Adjust to cooling coil temperature	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine if automatic expansion valve is inoperative Select proper automatic expansion valve according to unit design	<u>CUES</u> AXV operates erratic AXV internal valve defective	<u>ERRORS</u> Failure to do so will result in system not functioning properly

(TASK STATEMENT) III-20 REMOVE AND REPLACE AUTOMATIC EXPANSION VALVE

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) coding—[mfg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	MG TT Service order MG TT	Detail inference Informational report Terminology/general vocabulary Clarity of expression Detail inference

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(TASK STATEMENT) III-21 REMOVE AND REPLACE THERMOSTATIC EXPANSION VALVE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
STK MG SS-15 or SS-16 according to mfg's specifications	Install manifold and gauge Isolate thermostatic expansion valve from system Remove thermostatic expansion valve Install replacement thermostatic expansion valve Add additional charge to system Adjust super heat	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine if thermostatic expansion valve is inoperative Select correct thermostatic expansion valve according to unit design	<u>CUES</u> Cooling coil temperature erratic Sensor has lost its charge Internal valve sticking	<u>ERRORS</u> Failure to install correct valve would result in improper evaporator temperature

(TASK STATEMENT) III-21 REMOVE AND REPLACE THERMOSTATIC EXPANSION VALVE

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [heat transfer evaporator to condenser] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the promises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive—[DD]
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate MG MG Service order
SKILLS/CONCEPTS	
Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression	

COMMUNICATIONS

(TASK STATEMENT) III-22 INSTALL A DRIER, SIGHT GLASS OR MOISTURE INDICATOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK MG SS-15 or SS-16 according to mfg's specifications	Isolate area where component is to be installed Install component Purge component Recharge Check system pressures	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine where component to be installed Check mfg. specifications	<u>CUES</u> System requires component Excessive moisture in system Extensive service performed on unit	<u>ERRORS</u> Failure to follow procedures will result in components not performing adequately

(TASK STATEMENT) III-22 INSTALL A DRIER, SIGHT GLASS OR MOISTURE INDICATOR

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) Coding — [mfg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion — [refrigerant] Property of comparison — [measuring] Basic Measurement Skills and Concepts — [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

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III-23 REMOVE AND REPLACE HIGH OR LOW PRESSURE (TASK STATEMENT) SAFETY CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG	Install manifold and gauges Remove control Install new control Wire control Adjust control	Safety: Use care in handling of refrigerants Disconnect power before replacing control Hazard: May cause eye injury or skin burn May cause service electrical supply
<u>DECISIONS</u> Determine control inoperative Select control according to unit design	<u>CUES</u> Cannot adjust low cut-out Cannot adjust high cut-out	<u>ERRORS</u> Improper unit operation will occur

III-23 REMOVE AND REPLACE HIGH OR LOW PRESSURE (TASK STATEMENT) SAFETY CONTROL

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of materials [effect of expansion in bellows] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—[refrigerant] Property of comparison—[measuring] Basic Measurement Skills and Concepts—[MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive—[DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

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III-24 REMOVE AND REPLACE HIGH OR LOW PRESSURE MOTOR (TASK STATEMENT) CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG	Install manifold and gauges Remove control Install new control Wire control Adjust and calibrate control	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine control inoperative Select control according to unit design	<u>CUES</u> Control cannot be adjusted or calibrated with accuracy Control has open circuit	<u>ERRORS</u> Incorrect control will result in improper cycling

III-24 REMOVE AND REPLACE HIGH OR LOW PRESSURE MOTOR (TASK STATEMENT) CONTROL

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of material [effect of expansion in bellows] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts— [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive— [DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-25 REMOVE AND REPLACE OIL PRESSURE SAFETY CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG	Install manifold and gauges Remove control Install new control Adjust and calibrate control	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine control inoperative Select replacement according to mig specifications	<u>CUES</u> Adjustments or calibration cannot be made with accuracy Open circuit	<u>ERRORS</u> Failure to install correct control may result in system failure

(TASK STATEMENT) III-25 REMOVE AND REPLACE OIL PRESSURE SAFETY CONTROL

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Fluids under pressure [refrigerant under pressure in bellows] Effect of heating and cooling on expansion of materials [effect of expansion in bellows] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion [refrigerant] Property of comparison [measuring] Basic Measurement Skills and Concepts [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive [DD]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLFS	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

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III-26 REMOVE AND REPLACE HOT GAS DEFROST (TASK STATEMENT) SOLENOID AND VALVE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MG SS-15 or SS-16 according to mfg's specification	Install manifold and gauges Isolate HGDSV from system Remove HGDSV Replace HGDSV Purge and add charge or refrigerant to system level	Safety Always wear goggles and use care when handling refrigerants Care and use of hand tools Hazard Injury to eyes or skin burn Injury to oneself or others
<u>DECISIONS</u> Determine HGDSV inoperative Select correct replacement according to unit design or mfg specifications	<u>CUES</u> HGDSV solenoid has open circuit Mechanical operation of valve is erratic	<u>ERRORS</u> Incorrect replacement will result in continued defrost problems

**III-26 REMOVE AND REPLACE HOT GAS DEFROST
(TASK STATEMENT) SOLENOID AND VALVE**

SCIENCE	MATH — NUMBER SYSTEMS	
Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Uses of Numbers: (without calculation) coding — [mg data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion — [refrigerant] Property of comparison — [measuring] Basic Measurement Skills and Concepts — [MG] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate MG MG Service order	Detail inference Detail inference Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-27 REPAIR EVAPORATOR WITH EPOXY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK Epoxy patch kit Heat Lamp MG DC SS-15 or SS-16 according to mfg's specifications	Clean area Apply epoxy Blow to dry Evacuate Recharge	Safety: Care while using epoxy patch Use goggles while handling refrigerants Hazard: Irritates skin Eye injury or skin burn
<u>DECISIONS</u> Determine size and area of puncture	<u>CUES</u> Locate puncture in evaporator	<u>ERRORS</u> Failure to cover entire area with epoxy will render job unsuccessful

(TASK STATEMENT) III-27 REPAIR EVAPORATOR WITH EPOXY

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials Effect of heating and cooling on state of matter. [refrigerant] Fluids under pressure [refrigerant under pressure] Transfer of heat from one body to another [Heat transfer evaporator to condenser] Relationship of force to distortion in an elastic body [epoxy]	Rational Numbers Uses of Numbers: (without calculation) Coding — [mig Data Plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion — [refrigerant] Property of comparison — [measure] Basic Measurement Skills and Concepts — [MG, DC] Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance.	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing Viewing	MG DC Service order MG DC	Detail inference Informational report Terminology/general vocabulary Clarity of expression Detail inference

(TASK STATEMENT) III-28 REMOVE AND REPLACE CONDENSATION PUMP MOTOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK Wiring Diagram	Locate pump Remove pump Replace pump Test float	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine pump design as a replacement	<u>CUES</u> Float arm sticks from corrosion Pump motor has open circuit Pump motor shorted	<u>ERRORS</u> Improper float adjustment can result in condensate pan overflowing with water

(TASK STATEMENT) III-28 REMOVE AND REPLACE CONDENSATION PUMP MOTOR

SCIENCE	MATH - NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Resistance of materials to flow of electrical current [stock potential of current] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers: (without calculation) Coding—[mig. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs

COMMUNICATIONS		
<u>PERFORMANCE MODES</u>	<u>EXAMPLES</u>	<u>SKILLS/CONCEPTS</u>
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order	Detail inference Visual analysis Recognition of symbols, codes emblems Informational report Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-29 REMOVE AND REPLACE HUMIDISTAT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK Wiring Diagram	Remove control Replace new control Adjust Test	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine control inoperative Determine replacement control according to mfg. specification	<u>CUES</u> Triggering mechanism distorted Open circuit Failure to adjust control	<u>ERRORS</u> Failure to replace and adjust control will result in poor climate conditions

(TASK STATEMENT) III-29 REMOVE AND REPLACE HUMIDISTAT

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] [Effect of moisture on the Hyposcopic element] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of Numbers: (without calculation) Coding — (mfg. data plate) Fundamental Operations: (Calculation) Addition algorithm Subtraction algorithm Basic Measurement Skills and Concepts Reading and interpreting tables, charts, and graphs Representational graphs	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Wiring diagram Components Wiring diagram Service order	Detail inference Visual analysis Recognition of symbols, codes emblems Informational report; Terminology/general vocabulary Clarity of expression

(TASK STATEMENT) III-30 BALANCING THE AIR CONDITIONING SYSTEM

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK Thermometer	Measure temperatures at supply and return duct Adjust fan speed Adjust fan cut-in and cut-out and high limit switches Adjust supply registers and dampers	Safety- Observe proper use of hand tools and test equipment Could cause personal injury to oneself or others
<u>DECISIONS</u> Determine if air distribution is adequate Determine proper control adjustments according to mfgs.	<u>CUES</u> Inadequate heating or cooling comfort in certain areas Humidity too high	<u>ERRORS</u> Failure to isolate where air distribution is causing customer discomfort and make accurate adjustments would result in customer dissatisfaction

(TASK STATEMENT) III-30 BALANCING THE AIR CONDITIONING SYSTEM

SCIENCE	MATH — NUMBER SYSTEMS	
Indestructibility of energy and matter. [STK] Work input, work output, friction and efficiency in simple machines [Blower] Centrifugal forces developed by bodies in rotation. [Blower] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers Use of numbers without calculation coding [mfg. data plate] Fundamental operations (Calculation) Addition algorithm Subtraction algorithm Basic measurement skills and concepts Instruments [thermometer] Measurement (non-geometric) Weight Temperature Basic geometry skills and concepts Geometric relationships [ducts]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Schematic VOM-Continuity	Terminology Wiring diagram Detail inference
Viewing	Components/Wiring diagram	Visual analysis Logic Recognition of symbols
Writing	Service order	Informational report Terminology Clarity of expression

Duty IV Installing Warm Air Heating Systems

1 Install furnace gas—oil—electric

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(TASK STATEMENT) IV-1 INSTALL FURNACE GAS—OIL—ELECTRIC

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK SS-1-5-6-7-8-9 25-26	Position furnace Install blower package Install duct work Install plumbing Wire furnace Check operation	Do not lift loads from a bending position. Always lift from a squatting position with back straight Ground power equipment and use with care Care in the use of hand tools Care in working with gas, oil, electric power Potential back injury or rupture Electrical shock or personal injury Injury to oneself or others Explosion or fire
<u>DECISIONS</u> Determine location for furnace Position furnace for accessibility to chimney and duct work	<u>CUES</u> Survey premises for proper fuel supply, power supply and proper size unit	<u>ERRORS</u> Inadequate utilities or improper positioning or adequate size unit would result in faulty installation

(TASK STATEMENT) IV-1 INSTALL FURNACE GAS-OIL-ELECTRIC

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Work input, work output friction and efficiency. [V belt drive on blower] Effect of heating cooling on expansion of materials [bi metal] Centrifugal forces developed by bodies in rotation [Blower blade] Behavioral Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult appropriately when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rationals—Fractions Use of Numbers: (without calculation) [eyeballing floor area] Ordering—[S.T.K.] Coding—[mfg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts—Rule of thumb [approximation] Basic Geometry Skills and Concepts Knowledge of geometric relationships—Symmetry [center point] Determination of area, perimeter and diagonals of polygons with more than 4 sides. Basic Arithmetic Skills and Concepts—Property of comparison Basic Measurement Skills and Concepts Instruments—[tape] Measurement: Geometric Linear Area Reading and interpreting tables, charts, and graphs—[capacity chart]
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Speaking Writing	Instructions Survey premises Give instructions Service order
SKILLS/CONCEPTS	
Process report Visual analysis Terminology/general vocabulary Clarity of expression Informational report Terminology Clarity of expression	

Duty V Troubleshooting Warm Air Heating Systems

- 1 Check oil supply
- 2 Check oil pump
- 3 Check ignition system
- 4 Check heat exchanger
- 5 Check pilotband thermocouple assembly
- 6 Check wall thermostat
- 7 Check gas valve assembly
- 8 Check and adjust fan control
- 9 Check and adjust limit control
- 10 Check and adjust oil burner
- 11 Check natural gas manifold pressure

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(TASK STATEMENT) V-1 CHECK OIL SUPPLY

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK VG	Check storage tank Check filter Check nozzle Check suction line on pump Check pump Check ignition components	Safety Proper care and use of hand tools Hazard Injuries to oneself or others
<u>DECISIONS</u> Determine if oil is being supplied to chamber	<u>CUES</u> No heat Unit runs but cycles on safety	<u>ERRORS</u> Failure to locate lack of oil supply could result in unnecessary time on the job.

(TASK STATEMENT) V-1 CHECK OIL SUPPLY

SCIENCE	MATH — NUMBER SYSTEMS
STK Oil supply Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [Oil] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Speaking Writing	Instructions Survey premises Verbal instructions Service order
SKILLS/CONCEPTS	
Process report Visual analysis Terminology/General Vocabulary Clarity of expression Informational report Terminology Clarity of expression	

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(TASK STATEMENT) V-2 CHECK OIL PUMP

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK Vacuum gauge	Locate pump Hook up vacuum gauge Determine proper pump	148 SAFETY — HAZARD Proper care and use of hand tools Hazard Injuries to oneself or others
<u>DECISIONS</u> Determine type of pump and possibility of component failure	<u>CUES</u> No heat No oil in chamber Unit cycles on safety	<u>ERRORS</u> Failure to make proper diagnosis would result in replacing pump without cause

(TASK STATEMENT) V-2 CHECK OIL PUMP

SCIENCE	MATH — NUMBER SYSTEMS
STK Oil supply Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [Oil] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Speaking Writing	<u>EXAMPLES</u> Instructions Survey premises Verbal instructions Service order <u>SKILLS/CONCEPTS</u> Process report Visual analysis Terminology/General Vocabulary Clarity of expression Informational report Terminology Clarity of expression

(TASK STATEMENT) V-3 CHECK IGNITION SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK VOM	Check power supply to unit Check ignition transformer Check electrodes Check cad cell Clean and adjust Check operation	Proper care and use of hand tools Use care in check of power supply Hazard Injury to oneself or others may occur
<u>DECISIONS</u> Determine what electrical component is defective or may need adjustment	<u>CUES</u> No heat	<u>ERRORS</u> Failure to make correct diagnosis would result in improper repair

(TASK STATEMENT) V-3 CHECK IGNITION SYSTEM

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [Oil] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Writing	<u>EXAMPLES</u> Schematic VOM continuity Components—Wiring diagram Service order <u>SKILLS/CONCEPTS</u> Terminology Detail inference Visual analysis Logic Recognition of symbols Informational report Terminology Clarity of expression

(TASK STATEMENT) V-4 CHECK HEAT EXCHANGER

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Locate heat exchanger Inspect heat exchanger Test heat exchanger	Safety Proper care and use of hand tools Hazard Injuries to oneself or others
<u>DECISIONS</u> Determine that problem exists in heat exchanger	<u>CUES</u> Customer complains of smelling fumes	<u>ERRORS</u> Failure to determine that heat exchanger is defective could result in serious injury or possible death to the occupants.

(TASK STATEMENT) V-4 CHECK HEAT EXCHANGER

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Forces acting on a body immersed or floating in a liquid [Level] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rationals—Fractions Use of Numbers: (without calculation) [eyeballing floor area] Ordering—[S.T.K.] Coding—[mfg. data plate] Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts—Rule of thumb [approximation] Basic Geometry Skills and Concepts Knowledge of geometric relationships—Symmetry [center point] Determination of area, perimeter and diagonals of polygons with more than 4 sides Basic Arithmetic Skills and Concepts—Property of comparison Basic Measurement Skills and Concepts Instruments—[tape] Measurement: Geometric Linear Area Reading and interpreting tables, charts, and graphs—[capacity chart]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Speaking Writing	Instructions Position of mounting frame Verbal instructions Service order	Process report Visual analysis Terminology/General vocabulary Clarity of expression Informational report Terminology Clarity of expression

(TASK STATEMENT) V-5 CHECK PILOT AND THERMOCOUPLE ASSEMBLY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK MAVT	Check pilot flame and adjustment Check thermocouple Clean or replace defective components and thermocouple assembly	Safety Proper care and use of hand tools Hazard Injuries to oneself or others
<u>DECISIONS</u> Determine if pilot flame out of adjustment or thermocouple is possibly defective Determine type and size of components in assembly according to mfg. specifications	<u>CUES</u> No heat	<u>ERRORS</u> Failure to clean pilot or replace thermocouple or other components in pilot assembly would result in the problem continuing Parts could be changed unnecessarily or not fit properly

(TASK STATEMENT) V-5 CHECK PILOT AND THERMOCOUPLE ASSEMBLY

SCIENCE	MATH - NUMBER SYSTEMS
Effect of heating and cooling on expansion of materials [Bimetal] Transfer of heat from one body to another [heat on thermocouple] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Use of Numbers: (without calculation) Coding—Mfg. data plate.
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Writing	<u>EXAMPLES</u> Schematic MAVT Components schematic Service order <u>SKILLS/CONCEPTS</u> Terminology Writing diagram Detail inference Visual analysis Logic Informational report Terminology Clarity of expression

(TASK STATEMENT) V-6 CHECK WALL THERMOSTAT

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Check calibration of thermostat Adjust Replace if necessary Check operation	Safety: Always disconnect circuit and lock out breaker before working on electrical components Care in use of hand tools Hazard: Electrical shock, electrical burn Injury to oneself or others
<u>DECISIONS</u> Determine location of wall thermostat Determine type and calibration setting of thermostat according to mfg. specifications	<u>CUES</u> Burnier shots off on high limit No heat Not enough heat	<u>ERRORS</u> Failure to perform task properly would result in faulty operation of unit

(TASK STATEMENT) V-6 CHECK WALL THERMOSTAT

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [Oil] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of numbers (without calculation) Coding—[Mfg. data plate]
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Viewing Writing	<u>EXAMPLES</u> Central settings Central adjustments Service order <u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Informational report Terminology Clarity of expression

(TASK STATEMENT) V-7 CHECK GAS VALVE ASSEMBLY

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK VOM	Check valve Remove plunger and clean valve seat Check valve operation	Safety: Always disconnect circuit and lock out breaker before working on electrical components Hazard: Electrical shock—electrical burn
<u>DECISIONS</u> Determine if there is voltage to valve Determine type of valve used	<u>CUES</u> No heat Valve chatters	<u>ERRORS</u> Failure to make proper decisions would result in changing a part or making improper repair

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(TASK STATEMENT) V-7 CHECK GAS VALVE ASSEMBLY

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [Oil] Magnetic fields of force [Solenoid] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straightforward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Specifications VOM Components Service order	Detail inference Visual analysis Logic Informational report Terminology Clarity of expression

(TASK STATEMENT) V-8 CHECK AND ADJUST FAN CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK	Locate control Adjust control Check operations	Safety: Proper care and use of hand tools Hazard: Injuries to oneself or others
<u>DECISIONS</u> Determine control adjustment settings according to mfg's. specifications	<u>CUES</u> Fan runs continuously Insufficient heat No heat	<u>ERRORS</u> Improper adjustment would result in continued erratic operation

(TASK STATEMENT) V-8 CHECK AND ADJUST FAN CONTROL

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers. (without calculation) Coding—Mfg. data plate	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Specifications Central adjustments Service order	Detail inference Visual analysis Informational report Terminology Clarity of expression

(TASK STATEMENT) V-9 CHECK AND ADJUST LIMIT CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK	Locate control Adjust control Check operations	Safety: Proper care and use of hand tools Hazard: Injuries to oneself or others
<u>DECISIONS</u> Determine control adjustment settings according to mfg. specifications	<u>CUES</u> Unit short cycle No heat	<u>ERRORS</u> Improper adjustment would result in continued erratic operations

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(TASK STATEMENT) V-9 CHECK AND ADJUST LIMIT CONTROL

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effective heating and cooling on expansion of materials	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Writing	<u>EXAMPLES</u> Specifications Central adjustments Service order <u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Informational report Terminology Clarity of expression

(TASK STATEMENT) V-10 CHECK AND ADJUST OIL BURNER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK DG CO₂ K SGA	Check pump pressure Check nozzle size Check stack temperature Obtain CO₂ reading Obtain smoke density reading Obtain over five draft readings	Safety: Proper care and use of hand tools Use care when working with oil Hazard: Injury to oneself or others may occur Fire or explosion may occur
<u>DECISIONS</u> Determine proper firing rate Determine proper draft and over fire in pipe Determine according to mfg's. specifications	<u>CUES</u> Maintenance check Use too much fuel Smoke odor Insufficient heat	<u>ERRORS</u> Failure to check and accurately adjust burner would cause unit to operate inefficiently

(TASK STATEMENT) V-10 CHECK AND ADJUST OIL BURNER

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [Oil] Transfer of heat from one body to another [oil] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurements Skills and Concepts Instruments—[DG, CO₂K, DST, SGA] Given an instrument of measure, determine precision and or accuracy with respect to relative error, significant digits, and tolerance [DG, CO₂K, DST, SGA] Uses of Numbers: (without calculation) Coding—[Mfg. data plate] Basic Arithmetic Skills and Concepts Ratio and proportion [oil]	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Specifications Instruments Components Instruments Service order	Detail inference Visual analysis Logic Informational report Terminology Clarity of expression

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(TASK STATEMENT) V-II CHECK NATURAL GAS MANIFOLD PRESSURE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard Tool Kit Manometer	Connect manometer to manifold Take reading of the manometer Compare reading of manometer and gas meter dial to mfg. B.T.U. rating Adjust regulator accordingly	Safety: Make sure area is clear and metering device securely mounted away from fire and hands away from flame Hazard: Improper adjustment can cause back flash when burner lites or is extinguished
<u>DECISIONS</u> Remove plug from manifold and connect manometer	<u>CUES</u> Improper fire in unit causing loss of B.T.U. input and insufficient operation	<u>ERRORS</u> Regulator set too high will cause overfiring and burn out heat exchanger

(TASK STATEMENT)V-11 CHECK NATURAL GAS MANIFOLD PRESSURE

SCIENCE	MATH — NUMBER SYSTEMS
Work input, work output, friction and efficiency in simple machines	Ratio and Proportion
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading Writing	<u>EXAMPLES</u> Instructions Service order
	<u>SKILLS/CONCEPTS</u> Process report Informational report Terminology Clarity of expression

Duty VI Servicing and Repairing Warm Air Heating Systems

- 1 Replace heat exchanger
- 2 Remove and replace oil pump
- 3 Remove and replace cad cell
- 4 Remove and replace oil nozzle
- 5 Remove and replace electrodes
- 6 Remove and replace limit control
- 7 Remove and replace fan control
- 8 Remove and replace gas valve
- 9 Remove and replace wall thermostat
- 10 Remove and replace pilot safety
- 11 Replace blower motor shaft and bearings
- 12 Replace belt drive blower motor
- 13 Replace direct drive blower motor

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(TASK STATEMENT) VI-1 REPLACE HEAT EXCHANGER

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Locate heat exchanger Remove heat exchanger Replace heat exchanger Check unit operations	Safety: Care and proper use of hand tools Use care when working with gas, oil, or electricity Hazard: Injury to oneself or others may occur Fire or explosion may occur
<u>DECISIONS</u> Determine proper replacement; according to mfg's. model and serial nos.	<u>CUES</u> Crack or hole found in heat exchanger	<u>ERRORS</u> Failure to install proper heat exchanger could result in unit not functioning properly and inefficiently

(TASK STATEMENT) VI-1 REPLACE HEAT EXCHANGER

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Transfer of heat from one body to another [Expansion and contraction of chamber] Relationship of force to distortion in an elastic body [Expansion and contraction of chamber] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should answer questions which relate to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—[Mfg. data plate] Basic Geometry Skills and Concepts Knowledge of geometric relationships [Duct]
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Writing	<u>EXAMPLES</u> Data plate Mfg. instructions Components Service order <u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-2 REMOVE AND REPLACE OIL PUMP

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Turn off oil supply Remove pump Replace pump Check operation	Safety: Care and proper use of hand tools Use care when working with gas, oil, or electricity Hazard: Injury to oneself or others may occur Fire or explosion may occur
<u>DECISIONS</u> Determine replacement according to mfg's. model and serial Nos.	<u>CUES</u> No suction of pump Leak in pump	<u>ERRORS</u> Failure to make proper replacement could result in improper unit operation

(TASK STATEMENT) VI-2 REMOVE AND REPLACE OIL PUMP

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials (Bimetal) Fluids under pressure (Oil) Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculations) Addition algorithm Subtraction algorithm Uses of Numbers: (without calculation) Coding—Mfg. data plate Basic Arithmetic Skills and Concepts Ratio and proportion (oil)
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate Mfg. instructions Components Service order
SKILLS/CONCEPTS	
Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression	

(TASK STATEMENT) VI-3 REMOVE AND REPLACE CAD CELL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD 
STK VOM	Disconnect power supply Locate cad cell Remove cad cell Replace cad cell Check operation	Safety: Care and proper use of hand tools Use care in checking power supply Hazard: Injury to oneself or others may occur Severe electrical shock may occur
<u>DECISIONS</u> Determine replacement according to mfg's. model and serial Nos.	<u>CUES</u> Cad cell shows open or no resistance	<u>ERRORS</u> Failure to make correct replacement could result in improper unit operation

(TASK STATEMENT) VI-3 REMOVE AND REPLACE CAD CELL

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effects of heating and cooling on expansion of materials [Bimetal] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Mfg. instructions Components Service order	Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-4 REMOVE AND REPLACE OIL NOZZLE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Locate nozzle Remove nozzle Replace nozzle Check operation	Safety: Care and proper use of hand tools Use care when working with oil Hazard: Injury to oneself or others may occur Fire or explosion may occur
<u>DECISIONS</u> Determine correct nozzle replacement according to mfg's, model and serial Nos.	<u>CUES</u> No heat Nozzle plugged	<u>ERRORS</u> Failure to make correct replacement could result in improper unit operation

(TASK STATEMENT) VI-4 REMOVE AND REPLACE OIL NOZZLE

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [Oil] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Mfg. instructions Components Service order	Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-5 REMOVE AND REPLACE ELECTRODES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Locate electrodes Remove electrodes Replace electrodes Make proper adjustments Check operation	Safety: Proper care and use of hand tools Use care in checking power supply Hazard: Injury to oneself or others may occur Severe electrical shock may occur
<u>DECISIONS</u> Determine if electrodes are defective	<u>CUES</u> No heat No spark	<u>ERRORS</u> Failure to make proper replacement could result in improper unit operation

(TASK STATEMENT) VI-5 REMOVE AND REPLACE ELECTRODES

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, pre-test and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Writing	<u>EXAMPLES</u> Data plate Mfg. instructions Components Service order <u>SKILLS/CONCEPTS</u> Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-6 REMOVE AND REPLACE LIMIT CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
STK	Disconnect power supply Remove control Install new control and adjust Check operation	Safety: Disconnect power supply Proper care and use of hand tools Hazard: Electrical shock or burn may occur Injury to oneself or others may occur
<u>DECISIONS</u> Determine type of control according to mfg's, model and serial Nos.	<u>CUES</u> Control defective	<u>ERRORS</u> Failure to make proper replacement and adjustments would result in inefficient operation of the unit

(TASK STATEMENT) VI-6 REMOVE AND REPLACE LIMIT CONTROL

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculations) Coding—Mfg. data plate	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate M.T. instructions Components Service order	Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-7 REMOVE AND REPLACE FAN CONTROL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK	Disconnect power supply Remove control Replace new control and adjust Check operation	Safety: Disconnect power supply Proper care and use of hand tools Hazard: Electrical shock or burn may occur Injury to oneself or others may occur
<u>DECISIONS</u> Determine type of control according to mfg's, model and serial Nos.	<u>CUES</u> Control defective	<u>ERRORS</u> Failure to make proper replacement and adjustment would result in inefficient operation of the unit

(TASK STATEMENT) VI.7 REMOVE AND REPLACE FAN CONTROL

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Mfg. instructions Components Service order	Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-8 REMOVE AND REPLACE GAS VALVE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
STK	Turn off fuel supply Remove valve Replace valve Check valve operation	Safety: Care and proper use of hand tools Use care when working with gas Hazard: Injury to oneself or others may occur Fire or explosion may occur
<u>DECISIONS</u> Determine type of valve and proper replacement according to mfg's specifications	<u>CUES</u> Gas valve defective	<u>ERRORS</u> Failure to make proper replacement would result in unit not functioning properly

(TASK STATEMENT) VI-8 REMOVE AND REPLACE GAS VALVE

SCIENCE	MATH — NUMBER SYSTEMS	
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Magnetic fields of force [solenoids] Fluids under pressure [gas] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Viewing Writing	Data plate Mfg. instructions Components Service order	Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-9 REMOVE AND REPLACE WALL THERMOSTAT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD 
STK	Remove thermostat Replace thermostat and check calibration Check operation	Safety: Proper care and use of hand tools Hazard: Injury to oneself or others may occur
<u>DECISIONS</u> Determine type and/or replacement thermostat according to mfg's, model and serial Nos.	<u>CUES</u> Thermostat cannot be calibrated or adjusted	<u>ERRORS</u> Failure to replace with proper thermostat would result in unit not performing to its capacity

(TASK STATEMENT) VI-9 REMOVE AND REPLACE WALL THERMOSTAT

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Transfer of heat from one body to another [Heat on bimetal] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding-Mfg. data plate Basic Measurement Skills and Concepts Reading and interpreting representational graphs [Wiring diagram]
PERFORMANCE MODES	COMMUNICATIONS
Reading Viewing Writing	EXAMPLES Data plate Mfg. instructions Components Service order
SKILLS/CONCEPTS	Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression

(TASK STATEMENT) VI-10 REMOVE AND REPLACE PILOT SAFETY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
STK	Turn off fuel supply Locate defective component Replace defective component Check for proper operation	Safety: Proper care and use of hand tools Use care when working with gas Hazard: Injury to oneself or others may occur Fire or explosion may occur
<u>DECISIONS</u> Determine what component in safety pilot assembly is defective Determine type and size or proper replacement according to mfg's, model and serial Nos.	<u>CUES</u> No heat Customer must relight pilot or reset safety button	<u>ERRORS</u> Failure to replace proper component would result in complaint not being satisfied or continued erratic operation of the unit

(TASK STATEMENT) VI-10 REMOVE AND REPLACE PILOT SAFETY

SCIENCE	MATH — NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [STK] Effect of heating and cooling on expansion of materials [Bimetal] Fluids under pressure [gas] Behavior Science: Technician should talk only about the repair job and in a knowledgeable way, and promote his employer whenever possible. He should consult with superiors when difficulty arises. He should answer questions which relates to the repair job at hand with honesty and integrity. He should maintain a proper balance between pressure to complete job and pride in work. Emphasis should be placed upon performing the task at hand without unnecessarily disrupting surrounding activities and he should show concern for the premises. He should be cautioned to enter only into those customer relations which pertain to the job at hand. Personal entanglements or arguments with customers should always be avoided. Billing and discussion of costs should be accurate, honest and performed in a straight forward manner. He should get along with his fellow employee and develop a relationship that will not hurt each others professionalism.	Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Uses of Numbers: (Without calculation) Coding—Mfg. data plate Basic Arithmetic Skills and Concepts Ratio and proportion—Gas
COMMUNICATIONS	
PERFORMANCE MODES	EXAMPLES
Reading Viewing Writing	Data plate Mfg. instructions Components Service order
SKILLS/CONCEPTS	
Detail inference Visual analysis Informational report Terminology/General vocabulary Clarity of expression	

(TASK STATEMENT) VI-11 REPLACE BLOWER MOTOR SHAFT AND BEARINGS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
Standard Tool Kit Set blower bearings Blower shaft	Disconnect blower from unit Replace shaft and bearings in blower Reassemble blower in unit Check rotation of blower to observe proper clearance	Safety: Be sure cabinet or remaining parts are supported properly when repairing section is removed Hazard: When disconnecting blower unit it can drop thus denting housing making it inoperable after repair
<u>DECISIONS</u> To replace bearings only or complete shaft and bearing unit	<u>CUES</u> Noisy operation of blower unit	<u>ERRORS</u> Improper location of shaft stops can cause enough friction to cause overloading of blower motor

(TASK STATEMENT) VI-11 REPLACE BLOWER MOTOR SHAFT AND BEARINGS

SCIENCE	MATH — NUMBER SYSTEMS
Work input and work output, friction and efficiency in simple machines	Rational Numbers; Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate
COMMUNICATIONS	
<u>PERFORMANCE MODES</u> Reading writing	<u>EXAMPLES</u> Instructions Service order
	<u>SKILLS/CONCEPTS</u> Process report Informational report Terminology Clarity of expression

(TASK STATEMENT) VI-12 REPLACE BELT DRIVE BLOWER MOTOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
Standard Tool Kit Rubber Mount Motor V-Belt Amprobe	Disconnect blower supply Remove motor and replace Rewire motor Install V-Belt—align and correct tension Check unit motor amp draw against motor rating	Safety: Cover ends of disconnected wires Hazard: Motor can be dropped causing injury to the workers feet or fingers due to the position while performing the task
<u>DECISIONS</u> Proper H.P. motor	<u>CUES</u> Inoperative blower	<u>ERRORS</u> Improper wire connections motor runs wrong direction

(TASK STATEMENT) VI-12 REPLACE BELT DRIVE BLOWER MOTOR

SCIENCE	MATH — NUMBER SYSTEMS	
Work input, work output, friction and efficiency in simple machines	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive Inductive	
COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading Writing	Instructions Service order	Process report Informational report Terminology Clarity of expression

(TASK STATEMENT) VI-13 REPLACE DIRECT DRIVE BLOWER MOTOR

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY — HAZARD
Standard Tool Kit Direct Drive Motor	Disconnect power supply Remove complete blower assembly Remove motor from Mountina Brackets and reinstall with previous H.P. and R.P.M. rated motor Check operation	Safety: Lifting in an unnatural position can cause back injury Hazard: Keep hands free from blower compartment during the checking operation—can cause cuts, bruises and other injuries
<u>DECISIONS</u> Accessability to the blower compartment	<u>CUES</u> Bent shaft on old motor	<u>ERRORS</u> Make wrong wiring connections Rotation of motor

(TASK STATEMENT) VI-13 REPLACE DIRECT DRIVE BLOWER MOTOR

SCIENCE	MATH — NUMBER SYSTEMS	
Work input, work output, friction and efficiency.	Rational Numbers: Fundamental Operations (Calculation) Addition algorithm Subtraction algorithm Basic Arithmetic Skills and Concepts Ratio and proportion—oil Basic Measurement Skills and Concepts Instruments Given an Instrument of Measure, determine precision and/or accuracy with respect to relative error, significant digits, and tolerance. Basic Logic Deductive/Inductive Uses of Numbers: (without calculation) Coding—Mfg. data plate	
COMMUNICATIONS		
<u>PERFORMANCE MODES</u>	<u>EXAMPLES</u>	<u>SKILLS/CONCEPTS</u>
Reading Writing	Instructions Service order	Process report Informational report Terminology Clarity of expression

Index: Standard Tool Kit

STK—Standard Tool Kit

- 1-Wire Brush
- 1-Scratch Awl
- 1-Needle Nose Pliers
- 1-Standard Screwdriver Set 12", 6", 4", Stubby, and Pocket Size
- 1-Allen Wrench Set
- 1-Phillips Screwdriver Set 8", 4", and Stubby
- 1-Set Open Adjustable Wrenches 12", 10", 8", 6", 4"
- 1-Channel Lock Pliers
- 1-Standard Pliers
- 1-Socket Set $\frac{1}{8}$ " to $\frac{3}{4}$ "
- 1-Nut Driver Set $\frac{1}{8}$ " to $\frac{1}{2}$ "
- 1-Vaco Grip Pliers
- 1-Spark Drill
- 1-Swage Kit $\frac{3}{16}$ " to $\frac{1}{2}$ "
- 1-Set Orifice Drills
- 1-Level
- 1-Set Box End Wrenches
- 1-Set Open End Wrenches
- 1-Tube Cutter
- 1-Mini Tube Cutter
- 1-Flaring Tool Kit
- 1-Valve Wrench
- 1-Magnet
- 1-Hand Drill
- 1-Nozzle Wrench
- 1-Inspection Mirror
- 2-Spirit Thermometers
- 1-Flashlight
- 2-Pipe Wrenches 14", 10"
- 1-Crimper Tool
- 1-Hand Brake Tool
- 1-Rule or Tape
- 1-Pair Double Cut Snips
- 1-50' Grounded Extension Cord
- 1-Oil Can
- 1- $\frac{3}{8}$ Electric Drill
- 1-Set Drill Bits
- 1-Star Drill
- 2-Chisels 12" long and 1 cold
- 2-Hammers medium, large
- 1-Sheet Metal Hammer
- 1-Pair Straight Snips 3" jaw
- 1-Pair Left Snips
- 1-Pair Right Snips
- 1-Pair Goggles
- 1-Hack Saw
- Silver Clips
- 1-Hard Hat or Plastic Bump Hat

Index: Test Equipment

TEST EQUIPMENT

AP	AMPROBE
AVI	AIR VELOCITY INDICATOR
AVM	AIR VELOCITY METER
CA	CAPACITOR ANALYZER
CO ₂ K	CO ₂ KIT
CTK	COMBUSTION TEST KIT
DC	DIAL A CHARGE
DG	DRAFT GAUGE
DST	DIAL STACK THERMOMETER
ELD	ELECTRONIC LEAK DETECTOR
HLD	HALIDE LEAK DETECTOR
MAVT	MILLI AMP VOLT TESTER
MG	MANIFOLD AND GAUGES
PT	PRESTOLITE B TANK WITH TORCH HEAD
SGA	SMOKE GAUGE ANALYZER
SP	SLING PSYCHROMETER
TPT	TAYLOR PLENUM THERMOMETER
TT	THERMISTER THERMOMETER
UM	MANOMETER
VG	VACUUM GAUGE
VOM	VOLT OHM METER
VP	VACUUM PUMP
WM	WATT METER

Index: Standard Supplies

SS STANDARD SUPPLIES

1. PIPE JOINT COMPOUND
2. LEAK LOCK
3. SILVER SOLDER
4. SILVER SOLDER FLUX
5. COPPER TUBING
7. COPPER SWEAT FITTINGS
8. PIPE FITTINGS
9. GAS COCKS
10. REFRIGERATION VALVES
11. SEALING COMPOUND
12. DRIERS
13. SIGHT GLASSES
14. MOISTURE INDICATORS
15. CYLINDER R-12
16. CYLINDER R-22
17. CYLINDER NITROGEN
18. REFRIGERATION OIL
19. IN LINE SERVICE VALVES
20. CAPACITORS
21. OVERLOAD PROTECTORS
22. RELAYS
23. BELTS
24. FILTERS
25. TAPE: ELECTRICIANS, FURNACE, ARMAFLEX, FRICTION
26. ASSORTED WIRE NUTS, SHEET METAL SCREWS, NUTS, BOLTS

APPENDIX

	Domestic Refrigeration	Commercial Refrigeration	Air Conditioning	Heating
Duty I				
1. Install Window Air Conditioner	X		X	
2. Install Central Air Conditioner			X	
3. Install Self Contained Commercial Refrigeration Unit		X		
4. Install Remote Condensing Unit with Single Cabinet		X		
5. Install Remote Commercial Condensing Unit with Multiple Cabinets		X		
Duty II				
1. Hook Hermetic Compressor Direct to Power Supply	X	X	X	
2. Check Circuitry of the Compressor, Protector and Relay	X	X	X	
3. Check Capacitor	X	X	X	
4. Check Circuitry of Defrost System	X	X	X	
5. Check Circulation Fan Motors	X	X	X	
6. Check and Adjust Control Thermostat	X	X	X	
7. Attach Manifold and Gauges to Service Valves and Check Pressure	X	X	X	
9. Check Compressor Efficiency	X	X	X	
10. Locate Leak in a Refrigeration System Using Electronic Leak Detector	X	X	X	
11. Locate Leak in a Refrigeration System Using Halide Torch	X	X	X	
12. Locate Leak in a Refrigeration System Using Bubble Method	X	X	X	
13. Check Unit Operation—Oil Level—Sight Glass— Moisture Indicator		X	X	
14. Check and Adjust Automatic Expansion Valve		X	X	
15. Check, Test, and Adjust Thermostatic Expansion Valve		X	X	
16. Check and Adjust Pressure Motor Control		X	X	
17. Check and Adjust Low Pressure Safety Control		X	X	
18. Check and Adjust High Pressure Safety Control		X	X	
19. Adjust and Calibrate Oil Pressure Control		X	X	
20. Check Ice maker for Operation	X			
21. Check and Adjust Water Valve		X	X	
22. Check Hot Gas Defrost Solenoid and Valve	X	X		

	Refrigeration	Refrigeration	Conditioning	Heating
23. Check Humidity with Sling Psychrometer.....			X	
24. Check and Adjust Humidstat.....	X		X	
25. Check Condensate Pump and Drain.....		X	X	
26. Check Blower Assembly and Filter			X	X
27. Check Heat Pump Reversing System			X	
28. Check System for Burn Out and Install Cleanup Kit	X	X	X	
29. Service Electronic Air Cleaner			X	X

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1. Evacuate a Refrigeration System	X	X	X	
2. Pump System Down into Receiver Tank		X	X	
3. Recharge System Using Sight Glass		X	X	
4. Recharge System Weighing in Refrigeration		X	X	
5. Fill Dial a Charge	X			
6. Recharge a Refrigeration System Using Dial a Charge	X			
7. Remove and Replace Control Thermostat	X	X	X	
8. Remove and Replace Defrost Timer	X	X		
9. Remove and Replace Motor Overload Protector	X	X	X	
10. Remove and Replace Capacitor	X	X	X	
11. Remove and Replace Defrost Heater	X	X		
12. Remove and Replace Defrost Terminator	X	X		
13. Remove and Replace Relay	X	X	X	
14. Remove and Replace Fan Motors	X	X	X	X
15. Repair Leak in Copper Lines of System	X	X	X	
16. Remove and Replace Compressor	X	X	X	
17. Add Oil to System	X	X	X	
18. Remove Restriction from Capillary Tube	X	X	X	
19. Remove and Replace Capillary Tube	X	X	X	
20. Remove and Replace Automatic Expansion Valve		X	X	
21. Remove and Replace Thermostatic Expansion Valve		X	X	
22. Install a Drier, Sight Glass or Moisture Indicator		X	X	
23. Remove and Replace High or Low Pressure Safety Control		X	X	
24. Remove and Replace High or Low Pressure Motor Control		X	X	
25. Remove and Replace Oil Pressure Safety Control		X	X	
26. Remove and Replace Hot Gas Defrost Solenoid and Valve		X		
27. Repair Evaporator with Epoxy	X			
28. Remove and Replace Condensation Pump Motor		X	X	
29. Remove and Replace Humidistat	X		X	
30. Balance the Air Conditioning System			X	X

	Domestic Refrigeration	Commercial Refrigeration	Air Conditioning	Heating
Duty IV				
1. Install Furnaces Gas—Oil—Electric				X
Duty V				
1. Check Oil Supply				X
2. Check Oil Pump.....				X
3. Check Ignition System				X
5. Check Pilot and Thermocouple Assembly				X
6. Check Gas Valve Assembly				X
7. Check Wall Thermostat.....			X	X
8. Check and Adjust Fan Control			X	X
9. Check and Adjust Limit Control			X	X
10. Check and Adjust Oil Burner				X
11. Check Natural Gas Manifold Pressure			X	X
Duty VI				
1. Replace Heat Exchanger				X
2. Remove and Replace Oil Pump.....				X
3. Remove and Replace Cad Cell.....				X
4. Remove and Replace Oil Nozzle.....				X
5. Remove and Replace Electrodes.....				X
6. Remove and Replace Limit Control.....			X	X
7. Remove and Replace Fan Control.....			X	X
8. Remove and Replace Gas Valve				X
9. Remove and Replace Wall Thermostat			X	X
10. Remove and Replace Pilot Safety				X
11. Replace Blower Motor Shaft and Bearings.....			X	X
12. Replace Belt Drive Blower Motor			X	X
13. Replace Direct Drive Blower Motor			X	X